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VETERINARY JOURNAL

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Editorial.

OBSERVATION AND DRUGS.

"Two men look out through the same bars:
One sees the mud, and one the stars."
"Some men go through a forest and see no firewood."

KEEN observation is undoubtedly one of the most precious faculties a veterinarian can possess. To be of benefit, however, it must be of the trained order, and akin to that of the housewife who can extract information from an examination of the grain of meat or the breast and legs of a chicken. It is no good looking at things or noting incidents if we cannot gather information from the observation. Some men can see more at a glance and know better what they are looking for, than others who carry out prolonged observations but do not possess a very discerning mind. There is, perhaps, no science hitherto so inexact as that dealing with the uses of drugs. It seems to be a sign of modernity to look askance at any benefit to be derived from them. Few are the men, however, that do not employ them. We think that the views held as regards the action of many drugs need revising in the light of our knowledge of physiology and histology. How can it be expected that drugs given by the mouth can exert much action locally in cases where great tissue changes have taken place in muscle, tendon or bone? Yet in joint-ill, pyæmia and septicæmia we continue to give them. The real therapeutic effect of drugs can best be ascertained by noting and recording their healing action in hundreds of cases, and in this connection much valuable information is now being gathered in this war. There never was a time when opportunity knocked more persistently at the door.

XUM

Epizootic lymphangitis, erosive stomatitis and mange have been largely dealt with in France, and material has been gathered to show pretty conclusively how far drugs and their compounds assist in the cure of these diseases.

The man who dispenses with the aid of drugs to reduce temperature will have complications and long cases. Where fever arises in lung troubles and laminitis, we think records are plentiful enough to show that their use is very valuable. At any rate we should not like to discard sodium hyposulphite, pot. int., and acetanilid from our list. In some cases of stomatitis in various animals sodium hyposulphite is invaluable. We believe that the proper way to look at impaction of the rumen in cattle is to regard it as due to paralysis of the stomachs, and from records gathered in about 1,000 cases it is proved that the withholding of solid food for days, and treatment by drenching with linseed mucilage in which alternate doses of arecolin and veratrin are dissolved produces very good results, and is the best that can be given.

So as time goes on and proper and plentous observations can be made, we are hopeful that the science of therapeutics as concerned with drugs will become more exact and that we shall know that the middle way between their invariable use and their total rejection is the right and scientific one. G. M

Original Communications.

THE ORIGIN OF THE SO-CALLED "FORKS" IN BAGS OF OATS.

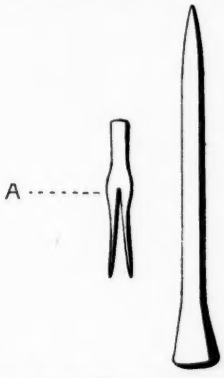
By Major FREDERICK HOBDAY.
Army Veterinary Corps.

Some little time ago the daily Press had articles in it reflecting on the malicious efforts of the Germans to injure the horses of the British Army by the insertion amongst the oats of a number of so-called "steel forks."

Casual observers, upon reading these articles, could not help but gain the impression that these pieces of steel had been specially manufactured for the purpose, and that they had been placed amongst the oats with the evil intent that the horse should swallow them; the hoped-for result being that they would penetrate the bowel and give rise to enteritis and subsequent peritonitis.

As the ends of the prongs are very sharp, this is a contingency which might perhaps happen, although a much more likely result would be the eventual formation of a calculus, the metal acting as a foreign body in the usual way in which a piece of metal does. The

chief point worthy of notice is that, although, of course, there are grounds for the surmise that the "forks" were put there maliciously, this does not necessarily follow; nor were they necessarily made for that purpose, as almost every horseshoe nail box contains a number



MACHINE MADE HORSE SHOE NAIL.
A. The end of the nail after it has been stamped out.

of these (in one we counted no less than 13), and it is quite conceivable that if oats and horseshoe nails travelled by the same transport, they might get intermingled. The sketch herewith is made from an actual specimen taken from a horseshoe nail box.

AN ENQUIRY INTO THE HORSE DISEASE KNOWN AS SEPTIC OR CONTAGIOUS PNEUMONIA.

BY LIEUT.-COL. H. WATKINS-PITCHFORD, F.R.C.V.S., F.R.S.E.,
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(1) THE writer feels, in putting forward the views contained in this report, he has attempted the construction of a theory upon hazardously meagre data, and that the clinical material afforded by the Swaythling Remount Depôt and Veterinary Hospital bears but a small proportion to the sum of material available elsewhere.

INTRODUCTION.

While diffidence is expressed therefore in suggesting the application of the findings of this report to pneumonic conditions generally throughout the Service, the fact is at the same time recognised that such cases as have come under review at Swaythling have been drawn from all parts of the United Kingdom, and may therefore be considered as representative of, and applicable to, generally existing conditions. It is further hoped it will be remembered that the need for the furnishing of this report at an earlier date than originally

intended has necessitated the deferring of several lines of the enquiry besides a recapitulation of certain details which it was hoped to include within the allotted twelve months originally set down for the work. The past eight months available to the investigation have, in addition, been very fully occupied, apart from research work, in the routine veterinary administration duties of a large Remount Depôt, a fact which, not unnaturally, has been much in restriction of progress.

PREVIOUS OBSERVATIONS.

(2) In the brief report furnished in September, 1915, attention was drawn to certain details in connection with the above disease. The conclusions arrived at—which were only of a tentative and preliminary nature—were based upon observation of the disease as it was found to exist in the Swaythling Remount Depôt, and such observations were confined merely to the ætiology or causes concerned with the origin and spread of the disease in the Depôt in question.

(3) Reference to that report shows that no evidence was then forthcoming as to the directly infectious nature of the disease from horse to horse, and the report further aimed at demonstrating the existence of a lengthy and indefinite period of incubation or latency existing between infection and obvious lung involvement. Extended and adequate observations—such as are necessary in dealing with a question of this nature—have naturally not been possible, inasmuch as the rapid passage of animals through, and their clearance from, the Depôt has rendered impossible any attempt at continuity of observation over an extended period. It may be said, however, that since the furnishing of the report alluded to, nothing has been found to conflict with the impressions therein recorded as to the absence of a direct infective agent acting within a definite period of time. Such negative conclusion appears to be endorsed by all who have had practical experience, either on land or during sea transport, in dealing with the disease. This at least is the impression left upon the writer's mind after enquiries from persons of experience whose views he has been able to ascertain.

(4) Further, the report in question showed that the factor of a seasonal incidence existed, although it wa recognised that the indications on this point available from a single Remount Depôt were open to the objection of insufficiency of data upon which to establish such conclusion.

(5) The writer is unaware whether the records of this disease at headquarters will support this view of a seasonal incidence, but he thinks they probably will be found to do so, and such evidence, if it exists, will not be devoid of significance in the present endeavour

to find a solution of some of the hitherto obscure points connected with the ætiology of the disease in question.

INFECTIVITY.

(6) Clinical observation and experimental test have both tended to show the non-infectious nature of the disease. Such negative conclusion has not been arrived at hastily, for it involves the necessity of otherwise accounting for the wide prevalence of the disease. No experimental evidence can here be cited supporting the theory of a direct transmission under normal circumstances from animal to animal; close contact during all stages of the disease having proved negative in results.

THE DISEASE NON-INFECTIOUS.

(7) The name of "Specific" or "Contagious" Pneumonia, both of which terms are frequently applied to the disease, appear to the writer as misnomers, and there also seems evidence leading to the conclusion that the term "Septic" is equally inapt as a designation of the disease if used in a specific sense.

(8) Recent observations, indeed, suggest the classification of the disease as one of an idiopathic rather than a specific nature, or, perhaps, a standing midway between the two categories, being due to the agency of an organism occasionally present in, but non-pathogenic to, the normal horse, and assuming a pathogenic phase under conditions of lowered vitality in the host which harbours it.*

(9) Amongst the several points leading one to a conclusion as to the non-infectious nature of the disease is the frequency with which ordinary catarrhal conditions precede cases which ultimately terminate fatally with gangrenous condition of the lung—typical cases of so-called septic pneumonia. All such cases as have come within the present observations have furnished a history of previous or existing catarrh. In several cases coming under notice, there has existed the history of an antecedent catarrhal attack some months prior to the pneumonic involvement. Such records are naturally rare in the circumstances afforded at Swaythling, inasmuch as convalescent catarrh cases are reissued as soon as fit, and are so lost sight of, it being only by accident that delay occurs in issue and a case is recognised as having been the subject of previous treatment for catarrh.

(10) This frequency with which, in pneumonia cases, a history of

*A somewhat parallel instance would be afforded by Frænkel's Pneumobacillus, a frequent inhabitant of the normal upper air passages, assuming its specific pathogenic phase only as reduced vitality in the tissues of the host permits establishment and generalisation.

past catarrhal attack is recorded or can be observed directly to precede and merge into a condition of pulmonary involvement, has shown the impossibility of ignoring the primary catarrhal phase in attempting a solution of the septic pneumonia problem.

(11) It is not suggested that every case of so-called septic pneumonia is preceded by a definite involvement of the Schneiderian membrane (such as constitutes the ordinary "catarrh"), though such history will be able to be traced in the great majority of cases.

(12) Having in regard the limitations expressed in para. 1, the writer ventures the opinion that the primary and essential condition leading to the development of this disease is one of impaired vitality of the lining membrane of the respiratory tract, and that this lowered vitality permits the lodgment within the membrane of an organism —in this sense a specific organism referred to subsequently as the "*x*" bacillus—which organism must be held responsible for the train of clinical and *post-mortem* phenomena which go to make up the disease known as specific or septic pneumonia. It is not necessary to recall that such lowered vitality of the respiratory membrane may arise from causes other than those of a specific nature. Cold, exposure, overwork, or even dietetic errors (such as may determine the congestion of the laminæ of the horse's foot) are all potential factors in establishing conditions leading to congestive states. Of the above causes, exposure and a state of reduced vitality consequent upon food shortage, are probably the chief causes operating in the production of the early stages of congestion necessary to the development of the disease in question.*

However arising, the writer considers this condition of congestion and stasis the first and essential step towards the development of more specific conditions, and up to this point the pathology of the disease is that of the ordinary sporadic form of pneumonia.

Connection of Catarrh and Pneumonia.

(13) The cough—so frequently a symptom of the ordinary catarrhal attack—and the lung embarrassment consequent upon exercise during such attack, point to the existence of a degree of

*A single typical example will suffice to illustrate the point. On February 9th, 32 H.D. horses were despatched to this depot from C———. They had been recently clipped, but wore rugs, and were twenty-seven hours upon the journey; 10° of frost was registered during the night. Upon arrival at Swaythling eight of these horses were showing a nasal defluxion, and within seven days twenty-four of the twenty-five were either in hospital or upon depot sick lines suffering from an attack of nasal catarrh of marked severity, with elevated temperature. The blood of six of these horses was examined and in each case the organism described below was obtained in pure culture from the circulation. Ten of these horses have already succumbed to pneumonia, a septic condition of lung being present in some instances.

pulmonary congestion as usually accompanying catarrh. Such theory is borne out by the absence of any well-marked clinical feature separating the two conditions of so-called " catarrh " and pneumonia, the one state merging into the other by progressive and ill-defined stages.

Same Causal Agent.

(14) The writer wishes to emphasise the difference as one of degree rather than of kind, inasmuch as in both conditions repeated observation has shown the probability of *the same causal factor* being concerned, directly or indirectly.

Organism in the Circulation.

(15) The organism in question has been found in 57 per cent. of cases in the circulation of the living animal when suffering from catarrh, and obtainable in pure culture from the blood of the same.

(16) The same bacillus can be shown to exist in an even increased percentage in the blood of horses, the subject of pneumonia, and also its presence in the various tissues after death.

(17) That this same organism is present occasionally in the circulating blood of horses not the subject of any catarrhal condition and apparently in normal health, was proved in the course of the investigation.

(18) There is no evidence, so far as the writer knows, to support the theory that the normal circulating blood may harbour indefinitely an organism of the type in question. Such a conception would be at variance with our views as the bactericidal character of the blood and of the intolerance of its cells to the presence of any foreign particulate matter whether organic or inorganic.

The Organism Pathogenic.

(19) The presence of bacteria in the blood-stream is recognised in several diseases during attack and convalescence, but always as an abnormal and temporary phenomemon, and as a sequel to an infective process. As far as we know, the bacteriolytic action of the blood is exerted upon non-pathogenic organisms at least as readily as upon those of pathogenic type, which latter indeed are often capable of exerting a resistive or repellent action (negative chemiotaxis) towards the white blood cell, tending to maintain their presence in the circulation.

(20) The existence therefore of the bacillus " x " in the circulating blood of the apparently normal horse is no evidence as to its non-pathogenic or harmless nature, and its occasional presence there

must be looked upon as a pathogenic phenomenon, even though at times no gross clinical reaction exists.*

(21) While the theory as to the non-pathogenic and normal nature of this organism in the blood is without support and against probability, the converse evidence as to its pathogenic nature is too weighty to be disregarded. Its occurrence in the circulation of the majority of cases of catarrh, its almost invariable presence in the circulating blood or organs of pneumonia cases, its association with pyrexial conditions and, not least, the agglutination phenomenon—which is so marked a connecting link between any given pathogenic organism and the disease produced by its agency—all these facts appear to the writer to constitute the strongest presumptive evidence as to the essential nature of this organism in the production of the disease.

(22) The presence of agglutinins in the blood of the horse suffering from, or recovered from, catarrh, is demonstrable to a marked degree, and exerted, so far as the writer has observed, only towards the specific organism in question. No other organism indeed has been so constant in its presence, either in the circulating blood or in the tissues, as to warrant any conclusion as to its essential association with either catarrh or pneumonia. Examination of the blood of fifteen of the 100 cases of catarrh showed other varying organisms, and, as a passing observation, it is interesting to note that a bacterial invasion of the blood-stream was thus shown to exist in 72 per cent. of the cases examined—*i.e.*, that only in 28 per cent. was it found to be in a sterile condition.†

(23) The degree to which the agglutinative principles exist in the blood of different horses varies considerably. This is as one would expect in view of the prevalence of the organism and the impossibility, in existing circumstances, of tracing antecedent attacks of catarrh in the horse, such as are probably the chief cause of the agglutination phenomenon. That this agglutinative power is not entirely dependent upon previous catarrhal attack, however, would

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*The ordinary "bacillus carrier" of the meningo-coccus or diphtheria organism would afford a parallel in the human subject where, without disturbance of the health of the host, a pathogenic organism is harboured indefinitely and later is able to re-establish its pathogenic effects when transferred to a susceptible subject. The bacilluria of the Enteric convalescent provides, perhaps, a closer analogy, inasmuch as the causal organism appears to maintain its existence in the blood-current itself for lengthy periods without re-exerting its pathogenic effects or interfering with the health of its host.

†This high percentage was only secured when the medium used was composed of, or made with the use of, horse flesh or serum in place of the usual beef cultivation media. The percentages given above are indeed capable of expansion inasmuch as the earlier estimations made upon media, from which the element of horse flesh was absent, and as such gave a lower figure.

seem probable from the agglutination of the normal ox and sheep, which, though not high, is definitely present. Such difference between the horse and the ox would appear likely to be due to the presence in the tissues of the former of some substance of a bio-chemical nature, permitting the more vigorous development of the organism in question. The *in vitro* experiment mentioned above (footnote para. 22) when dealing with cultural differences would appear to bear this out. (See also appendix, "Technique," 2.)

(24) It is further possible that this agglutinative power of the blood in the equine is of gradual accession and consequent upon recurring invasions of the blood-stream and tissues by the organism in question, invasions so slight as to evoke hardly any noticeable systemic reaction or condition of malaise. Evidence is accumulating to show that the unexpected thermic reaction occurring amongst the horses passing through Swaythling Depôt, mentioned in the writer's first interim report, is due either to this cause or is of the nature of a temporary lapse in the immunity of the horse towards the organism in question. More work, however, is necessary before speaking decisively upon this point.*

(25) Reference to the table mentioned above shows that the agglutinative principle is absent from the young equine or only present to a modified degree. The observations in question were made upon young carthorses and foals, and as this heavy class of horse is elsewhere shown to be particularly susceptible both to catarrhal attacks and pneumonic involvement, this absence may be held to apply *a fortiori* to the lighter classes of young horse.

(26) It is a feature of significance in considering the agglutination of the horse's blood towards the bacillus in question that the phenomenon is not only rapidly established by an attack of catarrh or by the introduction of the bacillus itself into the horse's system, but that it follows rapidly, and to a pronounced degree, upon the introduction into a normal horse of the blood of a catarrhal case, even though in the latter the existence of the bacillus cannot be demonstrated by cultural methods. The link in the evidence serving to connect the catarrhal attack with this organism as its specific cause is thus greatly strengthened.

(27) Not only is the agglutination index of a horse, which previously stood at zero, raised by the introduction of a small quantity of such

*In consequence of this observation it will be remembered that general instructions were issued from Headquarters making the recording of temperatures before issue a routine procedure. From the twelve months subsequent records of such cases of "temperature rejections"—at least so far as they apply to the Swaythling Depot—it would appear that this precautionary measure has been abundantly justified, and an average throughout the year of about 1·75 per cent. of all horses for issue have been withheld on this account.

catarrhal blood, but the figure to which it is raised may exceed the index figure of the horse furnishing the blood, a result which negatives the attempt to explain the phenomenon upon the ground of a mechanical transference of agglutinins from one animal to another, and furnishes additional evidence of the strictly specific character of the reaction.

(28) Several obscure points remain to be elucidated in connection with this agglutination reaction of the horse, which points, among many others, the writer had hoped to clear up before submitting his report, but the necessity for furnishing the same at an earlier date than expected has perforce left such work still in abeyance.

It seems, however, that the agglutination reaction in question is as specific and selective as Widal's Agglutination Test for Enteric, and that it furnishes as reliable an index of a specific bacterial invasion as that test affords.

(29) The foregoing paragraphs are thus summarised.

(*a*) The great majority of cases of specific pneumonia are preceded by an involvement of the nasal membrane, constituting the condition known as "catarrh."

(*b*) Such antecedent condition of catarrh is induced by depleting physical conditions and not by direct transference of infection from horse to horse.

(*c*) Throughout the clinical course of such cases a specific organism is present probably in all, but certainly in the majority of instances, both in the circulating blood and in tissues after death.

(*d*) The blood of animals suffering or recovered from either of these diseases acquires a specific property capable of clumping or agglutinating strongly the bacillus in question.

The conclusion drawn is that an essential connection exists between the ordinary catarrhal and pneumonic attack and the organism, which latter, though usually non-pathogenic to the normal horse, is capable, in circumstances of lowered vitality, of establishing a pathogenic action ultimately leading to grave tissue involvement. The manner in which the morbid action is established is dealt with in the immediately succeeding paragraphs.

PATHOLOGY.

(30) The early stages of a typical case of septic pneumonia will always furnish a history of a definite pyrexial period generally consequent upon exposure to cold or exhaustion, or a change of environment, such as removal to or from warm or ill-ventilated stables. In the great majority of cases a defluxion from the nose with or without loss of appetite leads to the detection of an elevation of temperature.

Over 60 per cent. of such temperature and catarrh cases will show the presence in their blood of the "*x*" bacillus, and this percentage will be much increased if a second examination of the blood is made in those cases which have failed to show the bacillus at the first abstraction. The organism will be found in nearly every case to be in pure culture, and direct microscopic observation of the blood will show that it also may exist in the blood-stream in the fully-developed, and, which is more remarkable, in the sporing condition, as well as in the resting stage. (v. photo-micro No. 1.)

(31) Absence of exercise at this phase of the disease will lead to subsidence of temperature though the defluxion may persist. Some cases, however, after temperature fluctuation, "go off their feed," the respiratory rhythm becomes accelerated to 18 or 20 per minute or more, and if failure to detect these abnormal conditions leads to exercise or exertion, symptoms of grave lung involvement, and the ordinary form of pneumonia ensues with hyperpyrexia and frequent involvement of the pleural surfaces. Bacteriological observations if repeated will continue to show the organism present in the circulation.

(32) The root of the lungs and anterior lobes appear to be involved primarily in the rapid consolidation which follows, and the development of a network of fibrinous lymph on the surface of the pericardium and diaphragm is a frequent condition, such network or layer assuming at times great thickness and consistency, though without evidence of organising. Inoculation made from the pleural or pericardial surface, exposed by dissecting off a portion of this membrane, will almost invariably give a pure culture of the bacillus in question. This fibrinous exudate may involve both surfaces of the main lobes, with, of course, the corresponding costal pleuræ, and the chest cavity may contain varying quantities (up to 25 litres) of turbid flaky lymph of varying, but generally low, specific gravity (average 1·025). Where such exudative changes have occurred, the pleural surface covering the lung frequently attains a considerable degree of thickness, in the main, apparently by deposition on the free thoracic surface, but also to some extent—and possibly primarily—from the throwing out of a plastic exudate under the pleural covering of the lung, this being apparently an extension of the same process involving the interlobular septæ, which latter map out the affected area in an arborescent manner.

(33) Here again dissection of the pleural membrane and inoculation from the sublying exudate on the surface of the lung will generally show by inoculation the "*x*" bacillus in pure culture, even if examination of smears made direct from the exposed surface fail to show its presence.

XUM

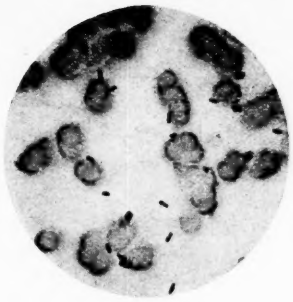
(34) The involvement of the lung tissue itself over the regions previously mentioned, often takes place without involvement of the pleural surface or exudative changes. Advanced tissue changes are often apparent in the substance of the lung without involvement of its pleural surface. These changes appear to conform closely with the usual morbid appearances of sporadic or idiopathic pneumonia. All stages from a primary congestion to a breaking down of the grey hepatised areas are present, and in all these changes the presence of the same organism can usually be demonstrated. Photo-micro 6 shows an impression smear made from a small area commencing to caseate.

THE "SEPTIC" CONDITION.

(35) It is noteworthy that an advanced condition of hepatisation, and even breaking down of tissue, may be reached without any suggestion of the pneumonic process assuming a "septic" condition. As the disease-phase advances, however, the liability on the part of the devitalised lung areas to become invaded by organisms of a septic or other type naturally increases. Such septic invasion may—and frequently does—arise early in the congestive stage; but it appears always to be of the nature of a secondary invasion due to a septic environment, such as most stabled horses are liable to. Recognition of this fact obviously furnishes the *rationale* underlying the open-air treatment of pneumonia, where an increased opportunity for oxygenation and freedom from septic environment often prevents the grave condition which ensues in cases where the tissue of the lung becomes septic.

(36) Even in the advanced septic state the bacillus, which appears to be the primary causal organism, can be isolated without difficulty, owing to its great resistance to a degree of temperature which kills other organisms.

(37) The foregoing sketch of the pathology of the disease is much briefer and less adequate than the writer had hoped to have put forward; but considerations of time have much curtailed all the present observations. It only remains to record that the lining membrane both of the heart and gastro-intestinal tract appear to be involved in the bacterial invasion. The heart is frequently ecchymosed and blotched in the left ventricle, particularly during the more acute phases of the disease. In such cases, dissection of the endothelial lining and inoculation from the hœmorrhagic heart-muscle lying directly beneath, will generally furnish a pure culture of "*x*" bacillus. In none of the cases coming within the notice of the writer has the serous covering of the heart been involved on its internal or cardiac surface, nor has any excess of fluid been noticed in the *pericardial sac*.



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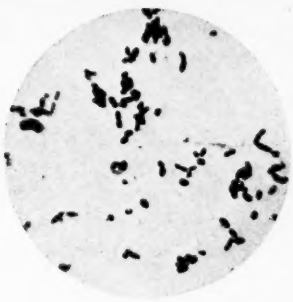

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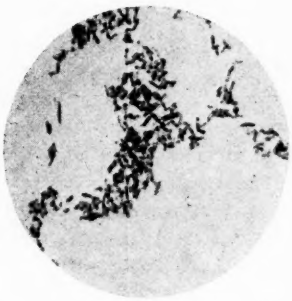

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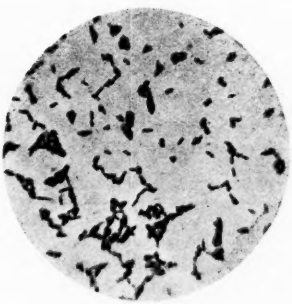

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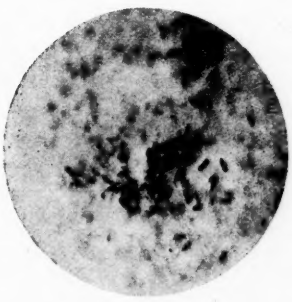

6

PHOTO-MICROGRAPHS OF BACILLUS DESCRIBED IN REPORT.

PHOTOMICRO No. 1.—A blood-film. Shows organism circulating in the blood of a horse. Some of the bacilli are observed to be in a sporing condition.

,, No. 2.—Longer form of same organism from an agar culture. The organism is sporing freely.

,, No. 3.—A young culture showing organism in rod form, not sporing.

,, No. 4.—Showing polymorphism of the organism, which occasionally assumes the coccal and diplo-coccal form shown here.

,, No. 5.—From a serum culture showing degenerate mycelial form of extreme age. Both this form and that shown in No. 4 become vigorous growths of normal type re-transplanted.

No. 6.—A smear from caseous lung showing a group of "x" bacilli amidst broken-down cells.

(38) The stomach and intestines appear in acuter cases to participate in the bacterial invasion. The mucosa of the former is frequently intensely injected, as is also the small gut and cæcum, particularly towards its closed end. Here, again, dissection, with aseptic precautions, of the mucous covering of the injected area will permit the organism to be isolated from the layers of the sub-mucosa, or the summits of the inflamed rugæ.

(39) Other organisms, particularly in advanced and septic cases, are met with, but so far as the writer has observed, none with such constant recurrence as to suggest other than an accidental and non-essential association with the disease under consideration.

(40) The pathological and clinical picture may therefore be briefly sketched as follows :—

Exposure, hunger, or other devitalising influences* lower the resistance of the respiratory tissues of the host, making possible the establishment of a bacterial invasion of the nasal and bronchial mucous membrane. The primary lesion is generally to be found in the Schneiderian membrane, or turbinated bones, which, besides being more exposed to temperature variations, form the channel through which any organism entering the pulmonary system must pass. The organism itself is widely spread, and evidence accumulates to show that, in common with disease-producing organisms, its degree of pathogenicity may become enhanced. As the paragraphs on its bacteriology show, the bacillus is strongly, though not entirely, ærobic, so that the exertion of its morbid effects upon the air passages is to be expected (a fact which would explain the absence of gross lesions in the other organs in which the bacillus is shown to exist).

(41) Congestion of lung tissue, whether arising from cold or from any of the other recognised causes, especially enforced exercise during temperature disturbance, is attended by embolism and occlusion,† and by the lodgment of the organism in the ultimate air passages

*The close atmosphere of the crowded or closed stable or the lower decks of horse-transports would appear to come within this category of devitalising causes, such effect being exerted upon the nasal and bronchial membrane, possibly through the presence of the high percentage of free ammonia in the respired air. It will be remembered that a horse contracts catarrh, etc., when brought from grass into a warm stable more frequently than when turned out from the latter to open-air conditions, however inclement these latter may be.

†The embolic occlusion of air vesicles and bronchioles would be explained from the cultural characteristics of the bacillus (q.v.). When growing under ærobic conditions the organisms forms a pellicle or skin of much tenuity or toughness such as would tend to the establishment of colonies or aggregation of bacterial bodies wherever the organism effected a lodgement. The production of infarcts in this manner is readily understood. A tendency to formation of a pellicle or tough aggregation does not exist on media made from the flesh of the ox, and such point may possibly serve to some extent to explain the absence of liability in the latter to lung involvement.

where the *optimum* conditions of warmth, stillness, and an adequate supply of oxygen ensure its vigorous proliferation, the restraining cellular influences exerted by a normal membrane having been impaired or abolished through the vascular congestion of the area involved.

Reference to the bacteriology of the organism shows that it is capable of exerting a proteolytic or tissue digestive influence, and, further, that it is capable of exerting such an effect under conditions where the supply of oxygen is almost entirely cut off—conditions, in fact, such as would exist in a hepatised or necrotic area. This observation supplies a link necessary to complete the pathological process, and to account for the extensive tracts of non-septic, broken-down, and disintegrated tissue which form so conspicuous a feature in the necropsy of an advanced and uncomplicated case of the disease. Where outside septic organisms are implanted upon a lung in this devitalised state, as is generally the case, the condition hitherto styled specific or septic pneumonia results, and the absorption of septic products causes in many cases a critical diarrhœa which hastens the termination of the case.

(42) The existence of an offensive smell in the breath of a pneumonia case with nasal discharge is not always a reliable index as to a septic condition of the lungs themselves. The breath may be offensive during life and the lungs subsequently found to be free from septic infection. Extension of the septic process of the lung has in several cases seemed to take place from the ozœna or fœtid discharge hanging about the anterior nares. It has been a frequent observation, also, that considerable areas of lung tissue may—*post-mortem*—be found to be in a septic state, whereas during life no fœtor of the breath could be detected.

(43) So far, therefore, as the writer has been able to determine from evidence afforded at Swaythling, septic pneumonia, as a disease *sui generis*, does not exist.

BACTERIOLOGY.

(44) The organism in the foregoing paragraphs referred to as bacillus "*x*" has been so styled because, though closely resembling the *B. subtilis* of the text-books, it has certain points of difference in morphology and culture which do not conform to those of the Hay bacillus. The resemblance, however, is very close, and the organism is probably one of a nearly allied group or, perhaps, a strain of the *B. subtilis*. No time, however, has been afforded for the determinac tion of any exact classification, nor has it seemed that such academi-point is of importance to the aim of the present effort.

(45) The *B. subtilis* has always been regarded as an essentially

non-pathogenic organism, so far as the writer—who has no adequate works of reference at hand—can recall. Its appearance, therefore, as an organism frequently present and actually sporing in the blood-stream, strongly evoking the formation of anti-bodies, and setting up morbid changes in the tissues of the horse—such facts call for an alteration of our previous opinion, unless indeed subsequent observations, by showing that the organism in question is not a form of *B. subtilis*, remove the charge of pathogenicity from the latter.

(46) Nor can it be recalled that proteolytic properties have in the past been attributed to this bacillus, though the possession of such is of importance in the present connection.

(47) Reference to photo-micrographs (Appendix B) will serve to show the forms assumed by this organism under varying conditions of culture, etc. Details of motility, spore-production, chromatism, etc., etc., have been observed as far as possible, but the greater part of such observations are not completed or cannot be tabulated in time to embody in a report already twice called for. The same holds good of a considerable mass of observations on the blood and the variations in its cellular content, etc., data which may be available to some future worker at the same disease problem.

(48) The data afforded by the present work are not sufficiently adequate to warrant the assumption that the bacillus dealt with is the causal organism in all cases either of catarrh or pneumonia; or, indeed, that it is solely concerned in the production of the cases reviewed. Other organisms may conceivably exist as causal factors in other forms of pneumonia while ultra-microscopic germs may have been present in the cases reviewed. All that can be said at the present stage of the work is, that no evidence of the constant association of other forms of bacterial life has been forthcoming either microscopically or by cultural method, while obvious and repeated evidence exists as to the very frequent association of an organism whose presence has hitherto remained unsuspected.

Prophylaxis.

(49) The writer has throughout this enquiry borne in mind that the devising of measures of protection is the direct object to be attained. To have devoted the short available time to empirical experiment in the hope of devising some short cut to protection without basing the same on a scientific survey of the nature of the disease, and the manner of its protection and spread, would have proved a policy—always inviting to the scientific tyro—but inevitably resulting in waste time, means, and effort. From a long-standing recognition of this fact, the writer has no results of experimental protective measures ready to submit, nor, indeed, have facilities for

the same been afforded other than on an entirely inadequate scale. The observations herein recorded, however, appear to constitute grounds for considering that the condition both of catarrh and pneumonia may possibly be made amenable to preventive treatment. The possibility of achieving so far-reaching a result is not entertained lightly or expressed without diffidence, for, from a somewhat extended experience, a full recognition is entertained of the difficulties attending the devising of practical preventive measures.

Future Work.

(50) While it is impossible to forecast the result of further investigation, the writer is confident in submitting the opinion that the recent work is too significant and the subject of too weighty a nature to be abandoned without a further effort of a more comprehensive nature. He is led to express this opinion by observing amongst other things the readiness with which the system of the horse reacts to contact with the organism which is the apparent specific cause of the disease in question.

(51) Any future work should, the writer submits, be conducted upon lines sufficiently adequate to permit of the findings of such work being applied generally, and wherever the disease conditions are found to exist. For this purpose, a much more adequate survey of the problem is necessary than is afforded under the present conditions of the investigations at Swaythling, where the work—limited in its scope—is attempted to be carried on under local conditions by an observer whose main duties lie in another direction. No greatly increased expense would attend a future wider effort ; but it appears essential that facilities in a broad and ample sense should be afforded if the prospect which the foregoing observations seem to open is to be realised.

(52) The writer, in submitting this report, again regrets the hasty and immature nature of the work, and can only hope that it may be deemed of some use as a progress report marking an extension of our knowledge concerning the diseases in question.

The Transmission of the Disease.

Transference by contact, both of pneumonia and the ordinary form of catarrh, appears to fail.

On several occasions, comprising together some fifty instances, an endeavour was made to transfer the catarrhal and incipient pneumonia condition to the healthy horses by prolonged contact with cases on squadron lines.

To render such contact as close as possible, nosebags were kept upon horses with profuse nasal discharge and high temperature, and

these nosebags were then used to contain the feeds given to the test horses. This procedure was adopted for several days in each case; but, with the exception of one dubious case of nasal discharge, the horses remained free from catarrhal or temperature disturbance.

The endeavour was also made to communicate more advanced forms of pneumonia, both by close co-habitation and by the more direct methods of blood transference.

Such endeavours, briefly summarised, showed that the lighter class of horse possesses a considerable degree of immunity as compared with the heavy draught type. This is also apparent from an observation of the following figures showing horses entering the Swaythling Depôt for the last nine months.

During the period June, 1916, to February, 1917, inclusive, 53,562 animals entered the Depôt. This number comprised 2,997 heavy draught horses. The percentage of heavy draught horses sent to hospital was 20·12 per cent., and of other all riding classes only 9·63 per cent. Of the total number of heavy horses evacuated (603) 67·4 per cent., or considerably more than half, were catarrh and pneumonia cases.

This statistical evidence, therefore, also tends to show the greater liability of the heavy horse. It is not easy to determine wherein this increased susceptibility lies. Hitherto it has been generally held that the conditions of environment and feeding of the draught horse are responsible for an increased liability to catarrh and pneumonia. The writer thinks, however, that the cause will be found to be deeper, and to be one of an inherent or racial nature, and he is led to this conclusion by observing the resistance to experimental infection shown by the lighter types of riding horse—a resistance which appears to be exerted against both the organism and the infectious blood itself.

The reactions following the introduction of the organism are varying in their time of onset, although a prompt response seems always to take place in the agglutinin content of the blood, which reaction seems to bear little or no relation to the thermic reaction, but rises promptly on the introduction of the bacillus or of infectious blood, frequently falls during the temperature curve, and again rises on the subsidence of the latter to a more or less permanent level. Generally, though not always, a fatal issue is preceded by the rapid fall of the agglutinin in index to zero or thereabouts.

The data avaliable are too meagre to attempt any interpretation of these phenomena—often seemingly in conflict—and further observations are necessary before any significance can be attached to the same.

In the lighter type of horse, inoculation frequently fails to evoke

thermal reaction, and this latter is often delayed until about the tenth day, or even longer, and is then slighter in its incidence. There may be a secondary reaction and the reappearance of the bacillus in the circulation unexpectedly and without exciting cause four months after the original reaction. Work is at present in progress tending to identify such unexpected secondary reactions with the reactions called attention to in the first interim report as occurring—without apparent cause—amongst the horses of the Swaythling Depôt. It is probable that the causal factor concerned in these cases will be shown to be identical with that which appears to be responsible for the primary and more marked attack.

Conclusion.

As far as the available evidence goes, it may therefore be concluded that septic pneumonia and its generally associated primary catarrhal condition are not infectious nor are they directly transferable from one horse to another except under certain conditions of experimental infection. These artificial conditions of infection are more readily induced in the heavier class of horse, upon which class also falls the main incidence of the disease itself. The chief, and probably the sole factor, determining the establishment of the disease would appear to be a condition of lowered vitality of the mucous membrane of the respiratory tract, however brought about, thereby rendering possible the invasion of a prevalent micro-organism. In this way collective outbreaks of a seemingly infectious nature become explicable on the grounds of a common exciting cause.

General Remarks.

The work of the enquiry—disjointed as it has necessarily been by the pressure of other more immediate duties—has been further restricted by the great difficulty of obtaining apparatus and material. Such apparatus as has been obtained has not been satisfactory for critical work. This remark specially applies to the microtome photographic and optical apparatus necessary, for economy prevented the obtaining of first-class apparatus, but delay in furnishing on the part of the manufacturers has been a much more serious cause of want of progress, and such details as efficient microscopic lenses, promised for early delivery many months ago, are still not to hand. The work therefore has had perforce to be carried out with means which have not always been suited to the critical conditions necessary to any work of research.

The cost of the enquiry so far has been approximately as under, and expended from the £1,000 voted for the carrying out of the investigation.

	£	s.	d.
Apparatus, equipment, fittings, etc.	272	10	0
R.E. services for slight alterations and fitments, erection of loaned fencing for paddock, etc., probably about	10	0	0
Salary of laboratory assistant	55	8	0
Incidentals	14	0	0
	£351	18	0

Exact figures are not all in the possession of the writer, but it is thought the total as shown will be found approximately correct and the unexpended balance about £645.

EDITOR'S NOTE.

The substance of the Report as above was accompanied by a number of appendices illustrating its text. These appendices comprise charts, tabular statements, micro-photographs, etc., and are too voluminous to reproduce here.

It is thought, however, that the text in itself is sufficiently clear to warrant the omission of these appendices.

THE FRENCH OPERATION FOR QUITTOR.

BY MAJOR VICTOR C. LECKIE,
Army Veterinary Corps.

THE following report of an operation for Quittor, styled the "French operation," is put forward as being found to be, from all points of view, the most successful method of dealing with Quittor in all its forms.

Various methods have been tried, but none have given such good results as the method hereafter described.

Out of 217 operation cases for quittor in horses between January 1st, 1917, and April 30th, 1917, the following results have been observed: Seventy-one were cured with an average of 41½ days under treatment; eleven have been transferred sick with an average of 33 days under treatment; twenty-two have been destroyed or died with an average of 21 days under treatment; 102 remain which have, to date, an average of 29 days treatment; the remaining eleven cases required a second operation, of which three were cured with an average of 82 days under treatment; one was destroyed after 55 days treatment; and seven still remain.

OPERATIVE TECHNIQUE.

Having ascertained the depth and direction of the sinuses by probing, a semi-elliptical incision is made (A to B, Fig. 2), the lower edge of the incision being parallel to the superior border of the coronary band. The portion removed is the shape of a "quarter" of an orange.

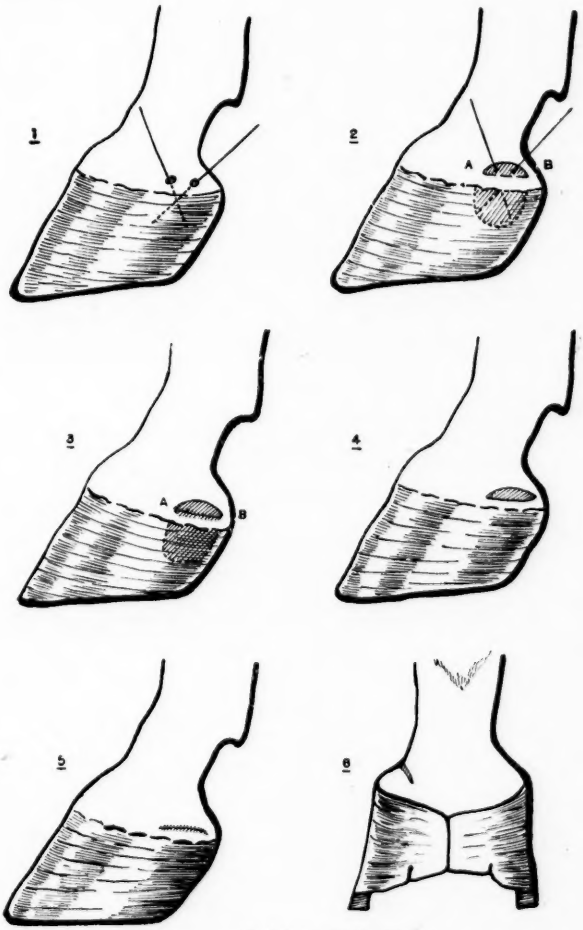

FIG. 1.—Position of the Sinus.
FIGS. 2 and 3.—Site of Incision and position of the Cartilage.
FIG. 4.—The Wound after the Cartilage has been removed.
FIGS. 5 and 6.—The Scar after healing.

XUM

Care is taken in making the incision to include the sinuses (one or more), taking in at least ½ inch on each side. The picture then produced is as in Fig 3, leaving the cartilage exposed to view at A and B. This is stripped out on the inside of the wall (as shown by the dotted line A C B, Fig. 3), with a Renette (the most useful pattern being as in Fig. 7), or with a " French hoof knife," as shown in Fig. 8.

By drawing from before, backwards, the whole of the lateral cartilage below the coronary band may be stripped out. The portion of the lateral cartilage above the coronary band may be removed with a scalpel and sage knife. In this way the whole of the lateral cartilage is removed, and the picture presented when the operation is completed is as in Fig. 4.

The cavity formed within the wall is packed with the following :—

Hydrarg Biniod	..	..	1
Calomel	..	..	2
Zinc Oxide	..	..	16

Fig. 7

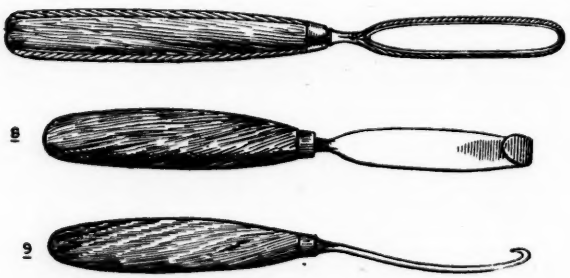

Fig. 8

Fig. 9

FIG. 7.—Renette. FIGS. 8 and 9.—French Hoof Knives.

The foot is bandaged and the dressing repeated in four days' time, or an alternative treatment being the above dry dressing once, and an application of hot hypertonic saline solution every alternate day.

ADVANTAGES.

For the foregoing operation the following advantages are claimed over other methods :—

1. The operation in itself is very simple.
2. It may be performed in 10 or 15 minutes.
3. The operation wound takes less time to heal than with other methods.
4. Very easy to dress. Lack of drainage does not appear to retard healing in the slightest.
5. There is no hoof deformity after the wound is healed.

6. Permanent lameness is very rare after the operation.
7. Less liable to open joint during the operation.
8. After about ten days the animal as a rule shows little or no lameness.
9. A second operation is very rarely necessary as the whole of the cartilage is extirpated.
10. By dressing every fourth day there is considerable saving in bandages, wool, and dry dressing powder.

AN EXTENSION APPARATUS FOR USE DURING FOOT OPERATIONS.

By Major J. R. HODGKIN.
Army Veterinary Corps.

Having felt the need of some mechanism for restraining the foot and making tense the capsular ligament during foot operations, particularly that for quittor, I had frequently expressed the wish that someone would think out a device for fixing the toe.

Fig. 1.—The Apparatus ready for Final Adjustment.

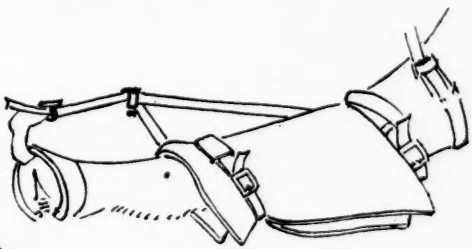

Fig. 2.—The Apparatus tightened up ready for the Operation.

An idea for such an apparatus occurred to No. 9635 Lance-corporal T. W. White of this hospital, who was at the time an assistant in the operating theatre. This was speedily improved upon; the design, of which I attach a sketch, was found to be most satisfactory, and was adopted. This has been in use in the hospital for over a year and a half.

It consists primarily of an iron framework with two stays to embrace the leg above the knee or hock. Interposed between this and the leg

is a felt pad, which is stitched on to the leather covering the iron frame. Each stay has a buckle fastened on to it inside and out, a single strap holed at each end completing the arrangement for attachment to the leg. It is important to have a buckle at each side, for then the device can be used on any leg—upper, lower, fore, or hind.

The remainder of the framework forms the lever which elevates the toe, and is roughly triangular in shape. The side of the triangle which connects the two stays and is next to the leg is arched, having a rectangular projection outwards. This is found to be necessary to prevent buckling when the toe was braced.

A serrated hook which clasps the toe of the shoe or foot, and to which is attached a buckle to join up to the strap mentioned above, completes the apparatus.

The foot having been prepared and the apparatus adjusted, the toe is braced as firmly as possible.

Advantages :—

1. There is perfect rigidity of the operation area, facilitating work.
2. The capsular ligament of the pedal joint is rendered tense, which minimises enormously the danger of its puncture.
3. It dispenses with the services of an assistant to hold the foot

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SURGICAL TREATMENT OF COMPOUND FRACTURE OF THE RIB.

By Captain A. R. ROUTLEDGE, A.V.C. (T.F.).

Method of Operation.

An incision, varying in length according to the class and extent of the fracture, is made along the middle line of the rib, down on the bone. The periosteum dissected back till the rib is exposed all round. Great care must be taken in carrying out this detail to guard against puncture of the thorax.

Some cases are easier to deal with than others, inflammatory action and suppuration occasionally causing mechanical separation, leaving the rib more or less bare.

Having completed the dissection, the rib is cut transversely above and below the fractured area with a strong pair of bone cutters, and the excised piece lifted out.

Transverse fractures are comparatively easy to deal with, a bone spoon or the finger being placed under the rib, lifting and pulling it up while the rib is severed with the cutters.

Extreme caution must be exercised when the rib is broken into long sharp fragments, which, in removal, are apt to puncture the pleural cavity.

Varying sections up to five inches of rib have been excised in this series of operations. Only two cases required a second operation.

AFTER TREATMENT

is as for a granulating wound—suppuration should be reduced to a minimum in a few days, if all the damaged bone has been removed; if it continues, a second operation is indicated.

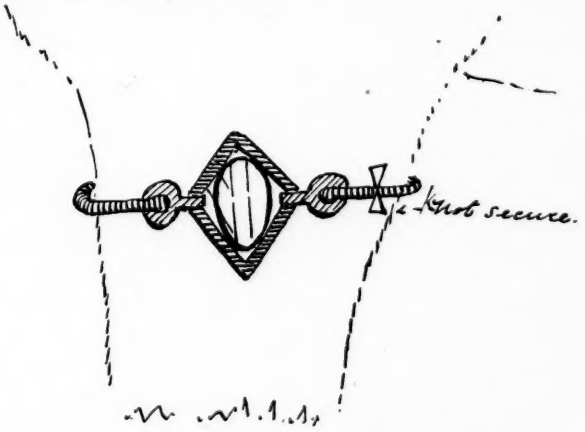
SUMMARY

Of 16 cases treated: one died three days after operation from pneumothorax; three destroyed; one chest punctured during operation; one three days after operation, pneumothorax; one twenty-five days after operation, pus burrowed behind the rib stump, septic pleurisy developed; five cases doing well, with an average of 28 days' treatment; seven cases cured and issued in 41·5 average days.

RETRACTING HOOKS FOR NEURECTOMY OPERATIONS.

BY CAPTAIN A. R. ROUTLEDGE, A.V.C. (T.F.)

Method of Use.—A piece of stout tape is applied to one hook which is fixed to one lip of the operation wound. The tape is drawn tightly round the limb and fastened to the second hook, which retracts the other lip of the operation wound.



The Retracter Hooks in Position.

If carefully fixed and tightly applied, hæmorrhage is checked, giving a practically bloodless field of operation. The tissues can then be readily identified—of great value in the median operation.

Hooks similar in pattern to an ordinary button-hook with spatula handle have been found of great use in performing neurectomy,

especially the median and posterior tibial operations, being useful to pick up the nerve or hold tissues back, and the handle can be used as a separator to isolate the nerve from the vein without dissection.

FOREIGN BODY IN THE PHARYNX OF A HORSE.

By Captain C. E. W. BRYAN.
Army Veterinary Corps.

Foreign bodies in the mouth of pharynx of the horse are not infrequently met with, and the one herewith sketched was of exceptional interest as illustrative of how much danger and discomfort can be caused by so small a thing.

Sketch of sharp, thorny twig (actual size) removed from the back of the Pharynx.

The animal on arrival was observed to be not feeding, with head poked out straight, suggestive of laryngitis. There was no temperature. The next day the same symptoms prevailed, accompanied with frequent retching movement of the head and neck. Also a desire to feed, but a difficulty in swallowing. A foreign body was suspected in the throat, and an examination in the standing position with an old pattern gag was made of the pharynx. A foreign body resembling

wire was felt, but owing to restiveness, no doubt caused by pain, the animal would not stand sufficiently quietly for it to be extracted, and he had to be cast.

Upon putting the patient down and examining the mouth leisurely with a speculum, the piece of thorn shown in the sketch was discovered and removed. It had become embedded in the mucous membrane and muscles at the back of the pharynx and required considerable ingenuity to remove it without damaging the tissues. A week later the horse was back at work.

For the sketch I am indebted to Staff-Sergeant Weyman, A.V.C.

NOTES ON CONTAGIOUS BOVINE PLEURO-PNEUMONIA IN NORTHERN RHODESIA.

By G. H. BROGAN, M.R.C.V.S.
Kalomo, Northern Rhodesia.

This disease was introduced into Barotseland in 1915 from Portuguese West Africa, where, according to all accounts, it has been endemic for some years. From there it was brought down to several cattle districts on the railway line by traders, whose principal object appeared to be to rush the cattle through and get rid of them. It transpired afterwards that a larger percentage of animals than usual expired on the way down, but no reports were made to the Department; there appears to be little doubt that a number of these deaths were due to pleuro-pneumonia. Cattle are the only animals affected in this country by the disease.

At first it spread rapidly—at all events rapidly for pleuro-pneumonia—largely owing to the fact that quarantine measures, in the absence of a qualified veterinary staff on the spot, were not rigidly enforced; this appears to be more responsible for such spreading than the susceptibility of the cattle or virulence of the disease. However, as soon as possible a veterinary officer was put in charge of each large infected area along the railway line, and systematic measures for the control and elimination of the disease were carried out as energetically as circumstances permitted. The measures adopted consisted of:—

(1) Quarantine of all herds in suspected area.
(2) Slaughter of all affected animals.
(3) Inoculation of all in-contacts and suspected in-contacts as far as the supply of virus permitted, and branding of all animals so inoculated.
(4) A buffer area, in which no cattle movements of any kind were allowed for some time, in order to cut the disease off from the remaining cattle districts.

Measures 1 and 4 do not appear to require any further amplification.

(2) This measure met with a good deal of opposition from local cattle-owners, who maintained that some animals recovered and salted. There is no doubt that some animals do recover and are possessed of a certain amount of immunity, but, owing to the danger of lungers, it is essential to success in controlling this disease to permit no recoveries at all.

(3) Pleuro-pneumonia inoculation, although nothing like so satisfactory as the simultaneous method in rinderpest, is still, in my experience, a beneficial measure in infected areas in those countries where absolute slaughter is out of the question.

I believe Dr. Theiler has succeeded in producing the disease with characteristic pulmonary lesions by inoculation in the tail, but, as far as one is able to judge by clinical work in an unfenced country, this only occurs occasionally, though on this account inoculation should never be recommended for totally clean areas.

Members of a herd which have not reacted to a first inoculation should be re-inoculated, and it will be necessary to do some a third time; animals which have not reacted by then will not react at all. In this connection calves prove more refractory than adults.

Glycerinated virus was generally used here, and kept under ordinary conditions; it does not appear to be safe to use it after ten days.

The thread method seems to be preferable to the syringe in actual practice in this country, as, owing to the tightness of the tissues of the tail, and the defective condition of most of the syringes immediately available in the field, some, if not all, of the dose is frequently lost by the latter method. Ordinary cleanliness should be observed, but the application of strong antiseptics to the tail is inadvisable, as should any obtain entrance to the tissues the resulting irritation does more harm than good.

In some cases inoculation was carried out by the owners themselves or their friends, who would not take the advice of the Veterinary Department, and in some instances they suffered heavy losses for the reason that they used an infected virus, or severely bruised the tissues of the tail during operations; perhaps in some cases both factors were at work. I came to this conclusion because of the rapid spread of gangrene up the tail; if this heavy mortality had been mainly due to the use of a strain of unusual virulence I think a number of animals would have shown joint lesions. The only animals I saw myself with joint lesions were in herds which were not unduly affected with necrosis or gangrene of the tail.

My conclusions in this respect are largely based on the reports I

received, as it was not possible for me to see all of these animals personally, owing to the large extent of country involved, the delay in receiving reports, and difficulties of transport.

The after-treatment of inoculated animals had to be largely left to the owners themselves, as the veterinary staff was much too small to carry it out, and, as the stock is running on large unfenced areas, there is no doubt that most of them are left to take their chance.

GENERAL.—The disease first appeared in this district in May, 1915, and the heaviest losses took place before the end of July, when I arrived to take control of the anti-pleuro-pneumonia measures in this district. The last case occurred on November 11th, 1916, so that there has been no case now for over seven months, but at the same time it is possible that there are a few lungers in existence. I append a list of statistics which is approximately correct, as all the herds were numbered fairly regularly and a mortality list kept.

APPENDIX: KALOMO DISTRICT.

FARM CATTLE.

Deaths P.P.	Deaths Inoc.	Deaths O.C.*	Total Deaths.	Remaining.
500	429	365	1,294	7,478

NATIVE CATTLE.

No. kraals.					
105	61	215†	—	276	2,231

Translation.

BACTERIO-THERAPEUTIC TREATMENT OF ULCEROUS LYMPHANGITIS.

BY C. TRUCHE.

AMONG ailments affecting our cavalry in the actual campaign, the lymphangites occupy a very important place. All veterinarians find themselves busy against these serious maladies, which, at first, furnish a strong contingent of non-effectives and then a number of chronic hospital cases. The length of treatment, the repeated care and attendance which they exact, puts science and the medical personnel to the test.

The two chief types, actually known, are epizootic lymphangitis, which we do not touch on here, and ulcerous lymphangitis, to which we have applied a simple and effective therapy, as we shall see.

Let us recollect, however, that for this latter ailment local treat-

*Includes other causes.

†Deaths from other causes are chiefly due to skin disease and poverty.

ment gives some good results, but these are only obtained after long months, and a relapse is always possible. It is also necessary to count equally on incomplete cures leading to thick legs, discharge or slaughter —in a word to very great monetary loss.

The Bacillus of Ulcerous Lymphangitis (b. of Preisz-Nocard).

The bacillus of Preisz-Nocard, concerning which we give briefly the essential characteristics, is a very ubiquitous one. It attacks different species of animals, causing: in the horse (besides ulcerous lymphangitis) contagious acne, renal abscesses; in the sheep, a veritable pseudo-tuberculosis, with caseous visceral and glandular lesions; in the ox and pig splanchnic lesions.

We have encountered in the past spontaneous abscess in the rabbit, and in the goat an abscess due to the exit of the microbe in the course of immunisation against the ricinus.

It is an organism simulating the diphtheria bacillus, both in its morphology and cultural characteristics; but it is radically distinguished by its virulence and the nature of its toxin, as we shall recall in two statements.

Virulence—Guinea pig.—Under the skin: abscess. In the peritoneum: vaginitis. In the veins: generalised pustular eruption, keratitis, osteo periostitis, granulations or caseous nodules in the liver, spleen, and lungs. The researches of Panisset (these Annals, June, 1910), carried out at the laboratory of M. Nicolle, have shown the great activity of the b. of Preisz-Nocard towards the guinea pig; certain samples infect it in even very feeble doses.

Rabbit.—In the veins: generalised pseudo-tuberculosis.

Sheep.—Under the skin: abscess. In the lungs: caseous pneumonia (Sivori).

Horse.—Under the skin: abscess. In a blood swelling: lymphangitis (Nocard).

Toxin (Carré, M. Nicolle, Loiseau, and Forgeot).—Every time large quantities of the germs are injected into animals they are rapidly killed by the toxin which they contain, and which does not differ from that of the filtrates. This toxin easily causes death to the guinea pig, rabbit, and sheep, even under the skin. The symptoms and lesions observed have nothing in common with those which determine diphtheritic poison.

Carré was the first to obtain an antitoxin serum which specifically neutralises the toxin of the bacillus of Preisz-Nocard. The same author has isolated from the system of certain sheep infected in a benign and localised form, some samples which were quite avirulent

(which have proved themselves equally a toxic).—M. Nicolle, Loiseau, and Forgeot.

ANTITOXIC POWER OF SERUM OF HORSES AFFECTED WITH ULCEROUS LYMPHANGITIS.

Uselessness of this Antitoxic Power.—M. Nicolle, Loiseau, and Forgeot have observed that the serum of horses affected with ulcerous lymphangitis (or multiple abscesses) was endowed with a ***specific antitoxic power*** equal or even superior to that of horses immunised by Carré by means of filtrates. They are based on this property, a sure and delicate diagnostic method (toxino-diagnostic) which reveals infection by the b. of Preisz-Nocard in the absence of all clinical symptoms (little abscesses of the kidney well tolerated). For details of Forgeot and Césari (these Annals, Vol. XXVI, p. 102—1912).

If one recognises a constant antitoxic power and the quasi-incurable character of the lymphangitis, one can affirm that the humours do not render any service to animals affected.

ABSENCE OF ANTI-MICROBIAN POWER IN THE SERUM OF HORSES AFFECTED WITH ULCEROUS LYMPHANGITIS.

The absence of all anti-microbian power in sick horses (Nicolle, Loiseau, and Forgeot) explains the essentially rebellious character of the affection, and leads to the trial of bacterio-therapeutic methods. Circumstances have not allowed them to realise this plan. We ourselves have had the same idea and have had an opportunity of carrying it out.

CHOICE OF A VACCINE : ITS PREPARATION, ITS MODE OF EMPLOYMENT.

We have given preference to microbes killed by alcohol-ether for a preparation quite convenient to use. Used *copiously* at the laboratory since the works of M. Nicolle on glanders (these Annals, Vol. XX, pp. 625, 698, 801—1906), they have the advantage of expelling the life (that is to say, the virulence) of the organisms without altering their antigenic qualities (and even, in a measure often sufficient, their toxicity). With these " alcohol ether " microbes M. Nicolle and his collaborators have practically succeeded in preparing agglutinising and lytic serums which are very effective and whose properties have already been mentioned in these Annals or will be eventually.

Preparation.—The b. of Preisz-Nocard preserved on coagulated serum is sown on potato, put in an autoclave for 24 hours, then the microbian deposit obtained is emulsionised in physiological water. It is centrifulgalised with Jouan's apparatus, decanted, and the sediment diluted in physiological water ; it is centrifugalised a second time, and finally decanted. The deposit is then carefully emulsionised in alcohol ; one attenuates it little by little with a fresh quantity of

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alcohol, and then adds an equal volume of ether. It is preserved for 24 hours in mouthed flasks (the organisms collect in the bottom of the flasks), the alcohol-ether is decanted, and the deposits are dried at 37° (Jouan's desiccation apparatus) in sterile boxes of Petri. One obtains in this manner a powder easy to preserve and dispense. To prepare the vaccine, one carefully emulsionises this powder in physiological water, in the proportion of 1 centigramme to 1 c.c. of liquid ; it is distributed into ampoules which are left for five minutes in a temperature of 100° C. (" safety sterilisation " and destruction of remnants of toxin. This last precaution may be said to be superfluous, since infected horses are immune against the poison).

Method of Use.—The vaccine is injected subcutaneously under the skin of the neck in a dose of 1 centigramme. This treatment is repeated every eight days on one or two occasions, according to the gravity of the case.

Slight local swelling occurs on the morrow and disappears rapidly. Feeble thermic reaction ($\frac{1}{4}$ to 1 degree). No general reaction. One sees " the buttons " dry up, suppuration decrease, and the cords disappear after the second injection, but cure generally follows the third. The affected limbs recover their mobility and the skin its suppleness as soon as the local lesions have disappeared. Relapses, which are rare, yield to a fresh injection.

ACTUAL RESULTS OF BACTERIO-THERAPEUTIC TREATMENT.

First experiments (Depôts of Belleville and Greuelle) :

Horse 10,812.—Buttons and cords on the near hind limb (bacteriologically diagnosed) ; three injections ; cure in a month.

Horse 12,117.—Very serious lymphangitis of the whole external surface of the off hind leg (bacteriologically diagnosed) ; three injections ; cure. This horse worked for over a year without having any relapse.

Horse 10,203.—Buttons on the off hind shank (bacteriologically diagnosed) ; three injections ; cure.

Horse 10,547.—Lymphangitis of the off knee (bacteriologically diagnosed) ; three injections ; cure.

Horse 11,233.—Buttons and cords on the near fore leg (bacteriologically diagnosed) ; three injections ; cure.

Later experiments undertaken through the kind support of Chief Veterinary Surgeon Jacoulet in a D.C.M.

First Series (Nos. 7918, 7919, 7928, 7905).—Classic lesions (bacteriologically diagnosed) ; three complete cures ; one still incomplete, but much improving.

Second Series.—Forty-three horses (no bacteriological examination but classic lesions). Results : a few after the third injection ; 14

completely cured ; seven without doubt cured ; only exhibit superficial lesions, due in our opinion to rubbing from mange with which they are affected. Ten incompletely cured (need one injection) ; six slightly improved (will need two injections) ; three died of different ailments in the course of treatment ; three slaughtered because of old age or bad general condition.

In this second series, where bacterial diagnosis had not been made, might possibly be included subjects affected with a lymphangitis to which the b. of Preisz-Nocard remains foreign. The majority of the cases, however, show how beneficial the treatment is. Other cases in different parts of France have been treated with success.

We conclude that bacterio-therapeutic methods applied by us in the treatment of ulcerous lymphangitis have furnished quite indisputable results. These results are interesting, not only from the theoretical point of view, but from an economic and immediate aspect.—(*Annales de l'Institut Pasteur.*) G. M.

SOME PROFESSIONAL MATTERS CONCERNING THE ITALIAN ARMY VETERINARY CORPS.*

At the sitting, on July 4th, 1917, of the Italian Chamber of Deputies, a direct question was asked of the Minister of War, in the name of sixty members, upon the conditions of undeserved inferiority existing in the Veterinary Corps, as compared with other Corps and the Veterinary Corps of other Armies ; and, on his having promised, but not conceded, certain improvements, both moral and pecuniary, at the end of May, 1916 (which were re-confirmed in September, 1916), which assured to the Army Veterinarians the following points :—

(1) Due recognition by the authorities concerned for good service rendered in the field of hygiene and of horse-mastership.

(2) A state of contentment which is indispensable for the carrying out of professional duties.

(3) The power to apply discipline more thoroughly than is actually done at present to the personnel of the dispensers, dressers, and orderlies.

(4) To recognise the fact that they provide the country with an efficient protection in connection with the live stock, defending it against disease, and providing at the same time for the provisioning of the civil and military population, a very grave problem.

The Hon. Signor Pucci, after having very eloquently explained the important function of the A.V.C., especially during the war, and having put before the Chamber many examples of the inferior position in which Italian veterinarians were placed in comparison with those of other armies, etc., suggested a method of reform which

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the Government ought to follow, not only in the moral and material interests of veterinarians, but also in the interests of national economy. He then went on to say: "To obtain the best preservation of the animals necessary for the development of warlike operations, the first consideration is that they shall be carefully selected and examined at the commencement. This, in our opinion, should be arranged for by the heads of the Army Veterinary Service who have to provide for the needs of a certain area. Upon these officers must be conferred the rank of lieutenant-colonel, which would give them the military authority required for the observance of their orders. It is also advisable to place the 'Camp Infirmaries' under the direction of veterinary majors, who are likely, as a result of their long practical experience, to manage them to advantage and to render them more perfect. It is, in fact, essentially in these camp infirmaries that opportunity exists for the most thorough examination of animals, because it is from these establishments that diseases may be disseminated. The veterinary lieutenant-colonels of the army must also, for disciplinary reasons, be eventually raised to the rank of colonel. We should not delay the promotion to captains of all those subalterns who rendered effective service early in the war—this would prevent veterinary lieutenants finding themselves under the orders of captains who were only sergeants before they obtained their effective promotion.

In effecting this system of creating veterinary officers for the needs of war, we should have colonels placed in control of the bacteriological laboratories, the schools of cavalry, general management and horse inspection; the lieutenant-colonels in close conjunction with G.H.Q., and the majors in touch with the control of the most important infirmaries. These embody the proposals which I hope will be confirmed by the Minister of War, and also by the Commander-in-Chief in the true interests of the animals entrusted to the Military Veterinary Corps."

The Under Secretary for War, General Montanari, replying to the Hon. Signor Pucci, spoke of the differences existing on the question of rank in the different armies, stating that all the armies unfortunately had not the same powers for improving the careers of their officers, and we must not forget that the Government quite recently has gone into this matter of the Army Veterinary personnel, making many promotions. There has been an increase in the number of lieutenant-colonels and majors (increases respectively of 150 per cent. and 50 per cent.) and the promotion to be majors of those captains who gained their first epaulets in 1890. Also that all lieutenants dating from April 9th, 1911, automatically attain the rank of

captain, some being of the standing army, and some of the Territorial Militia, as a matter of fact the total has been more than 100 officers. This has been already carried out, and it is noteworthy that the lieutenants who are promoted to be captains equal in ***status*** the captains of the Carabinieri and Cavalry. This should prove quite satisfactory. As to the other questions raised by the Hon. Signor Pucci, the Government is by no means unwilling to examine his proposals and projects, and where it is possible to provide that duties correspond with rank.

The Hon. Signor Pucci thanked General Montanari, and after a few criticisms came to the conclusion that for the organisation of the Army Veterinary Service they could depend upon being treated by the Government with justice and consideration.

Correspondence.

PUNCTURED EYEBALL CASE.

To the Editor of THE VETERINARY JOURNAL.

DEAR SIR,—Captain Routledge describes an operation on punctured eyeball cases in your last issue which I think deserves notice. It is quite evident that in bad injuries of the eye the complete removal of the eyeball, with its possible septic complications, is not necessary unless the injury is accompanied by a septic wound affecting the orbital fat. I do not find cocaine necessary, as chloroform is used, and the contents of the eye are always carefully removed, even to scraping away the retina and flushing out the cavity, in order to shorten the period of suppuration. The membrane nictitans is always removed, for the reason given by Captain Routledge.

The main advantage of this operation is undoubtedly the shortness of the period required to keep the animal off work. The pain is markedly less the day following, and the horse may return to work within a week.

Daily flushing of the cavity with saline solution is tolerated by most horses after the first day without restraint.—Yours truly,

L. AUCHTERLONIE (Captain A.V.C.).

Personal.

CAPTAIN STEWART and CAPTAIN J. M. RICHARDSON, A.V.C. (R.F.), have each been awarded the Military Cross "for Immediate Reward." Captain Richardson was wounded but has, we are glad to say, progressed satisfactorily. They were each specially reported upon for the excellent services which they had rendered.

NOTWITHSTANDING the fact that they have each reached the age at which they may legitimately expect to take things easily, and not be serving amongst the irksome duties of war, Professor Veranus A. Moore, the Director of the New York State Veterinary College, Cornell University, and Professor Williams, the well known teacher of Surgery in the same Institution, are each doing good work for the Veterinary Department of the American Army. Brilliant examples which cannot help but make the younger members of the profession "do their bit"—ungrudgingly, too.

A NUMBER of deaths have recently occurred amongst our French colleagues, and several have received honourable mention:—MM. Callard, Roux, Foucault, Abraham, and Chuffat have been killed by bombs or shell fire. MM. Picq, Bouchet, Satillat, Rouard, Granon, Moura, Moncharmont, and Girard have each been specially mentioned in Orders for zeal and devotion to duty under trying conditions.

Obituary.

CAPT. ALFRED HOSKIN, F.R.C.V.S., A.V.C.

The toll of war has taken another of our most promising young officers, for Capt. Alfred Hoskin had already "made good" in his professional career. Born at Liskeard, in Cornwall, in 1891, he graduated from the London College in 1913, and took his Fellowship at the earliest possible opportunity. Joining the Army Veterinary Corps in October, 1914, he had in due course obtained his Captaincy, serving most of his Army career with the Expeditionary Force in France. He was seriously wounded on the 2nd of July, and died two days later.

NOTICES.

All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C.2. Telephone: Gerrard 4646. Telegrams: "Baillière-Rand, London."

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